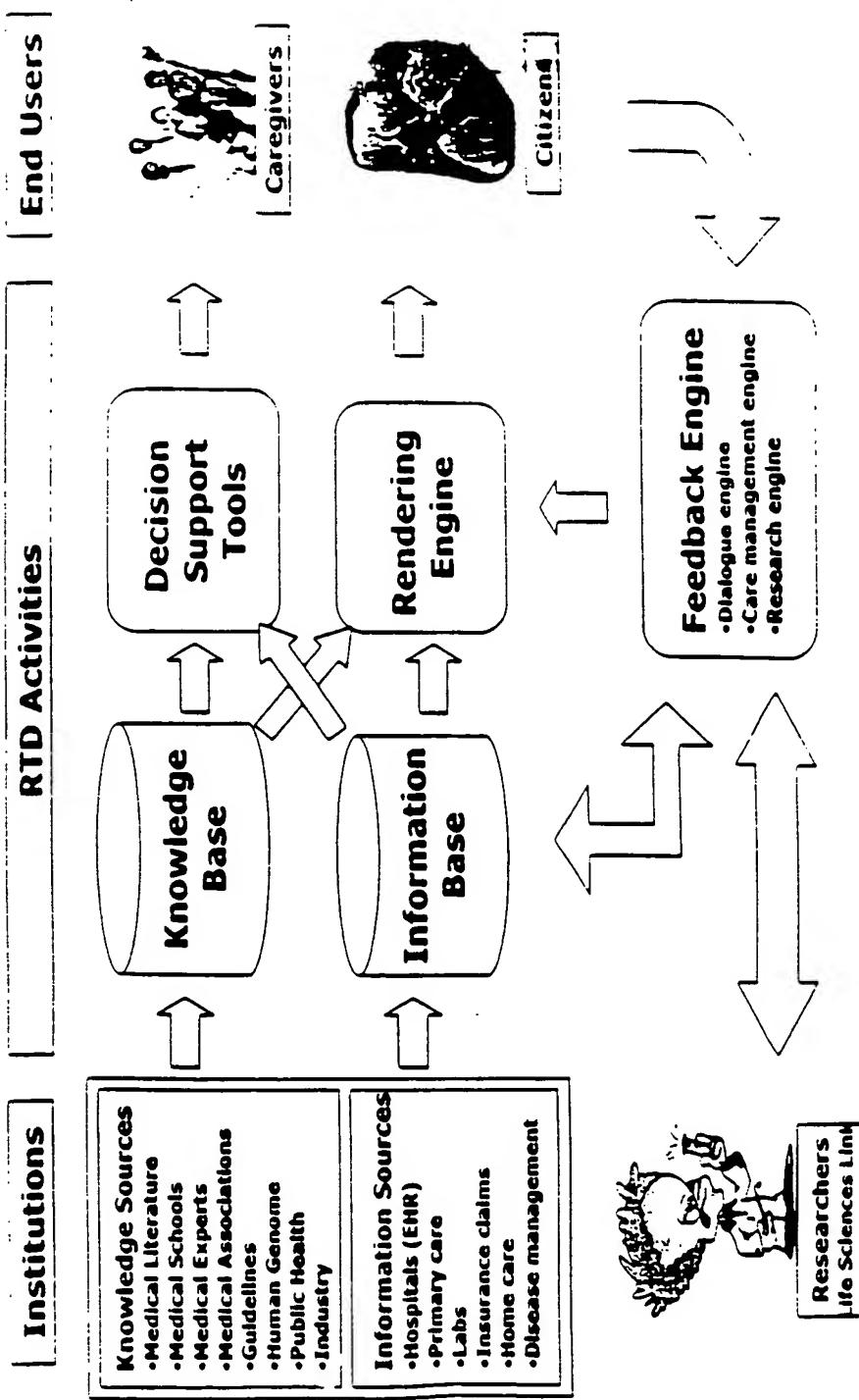


# Project Overview



Blakely, Sokoloff, Taylor & Zafman LLP

(408) 947-8200

Title: Method and System For Integrating Feedback Loops in Medical Knowledge Development and Healthcare Management

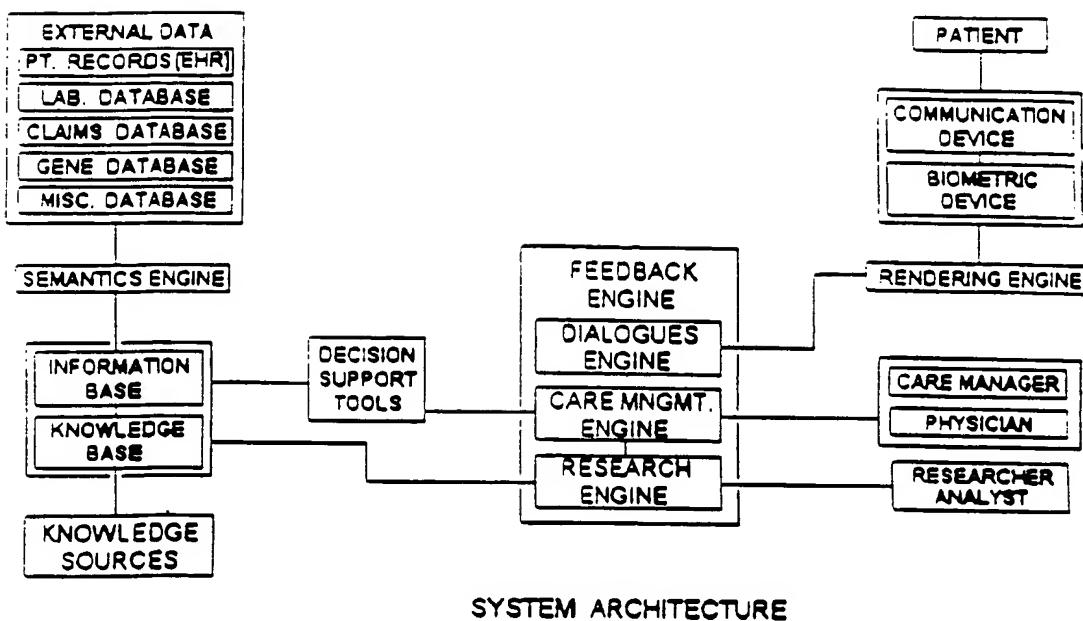
1st Named Inventor: Stephen J. Brown

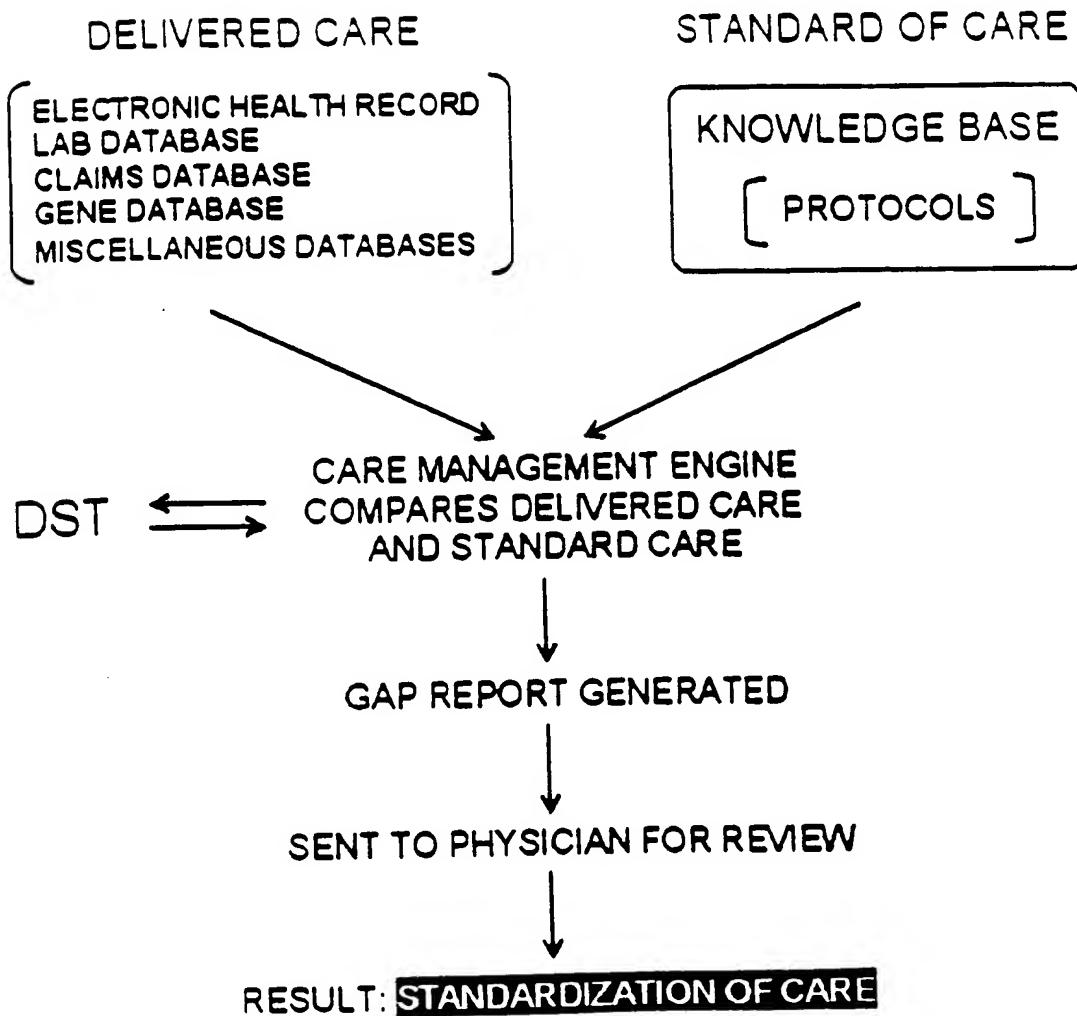
Application No.: 10/821,120

Docket No.: 6858P056

Sheet: 1 of 31

**FIG. 1**

**FIG. 2**

**FIG. 3**

Blakely, Sokoloff, Taylor & Zafman LLP

(408) 947-8200

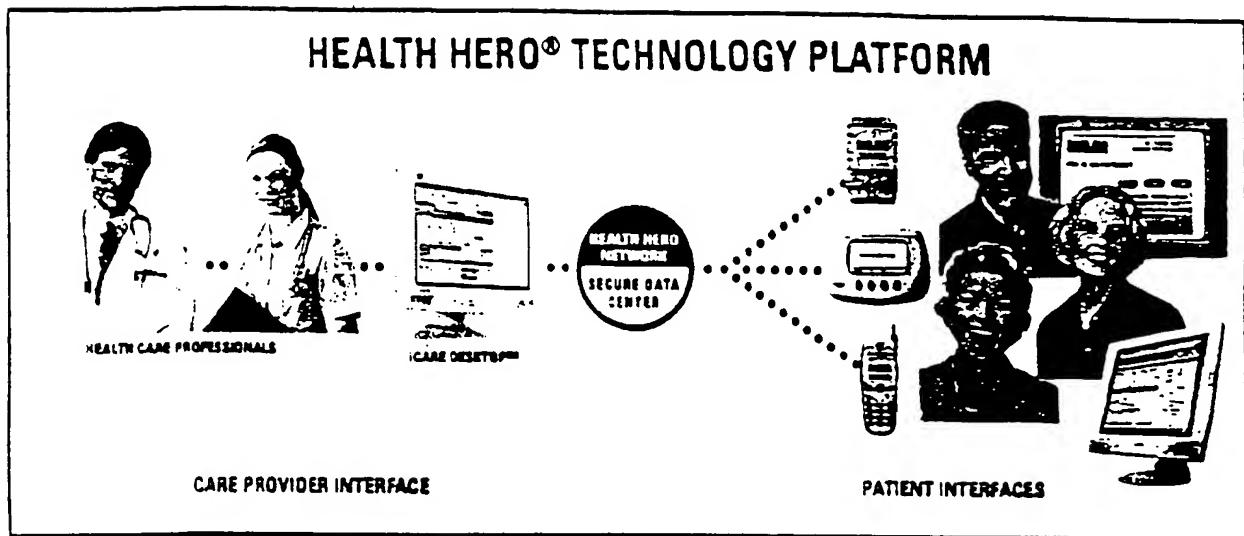
Title: Method and System For Integrating Feedback Loops in Medical Knowledge Development and Healthcare Management

1st Named Inventor: Stephen J. Brown

Application No.: 10/821,120

Docket No.: 6858P056

Sheet: 4 of 31



**FIG. 4**

Geoffrey Clapp  
Wed, November 26, 2003

(Find Patient) GO D Contact / Health News D Help D Log Out

Home Patient Reports Enrollment Disenrollment Schedule Setup

You have 7 unreviewed inbox items: 1 Alert, 6 High Risk Results, and 1 Note overdue.

iCare Inbox Refresh Submit

Check All Clear All

Date	Category	Subject
<input type="checkbox"/> 07/21/2003	Alert	2 pound weight gain for patient Gill, Hal
<input type="checkbox"/> 07/21/2003	Results	High Risk Symptoms for Patient Luns, Craig
<input type="checkbox"/> 07/20/2003	Results	High Risk Symptoms for Patient Clepp, Geoff
<input type="checkbox"/> 07/20/2003	Results	High Risk Symptoms for Patient Colf, Laurie
<input type="checkbox"/> 07/19/2003	Results	High Risk Symptoms for Patient Cherry, Julie
<input type="checkbox"/> 07/19/2003	Results	High Risk Symptoms for Patient Mann, Marie
<input type="checkbox"/> 07/19/2003	Results	High Risk Symptoms for Patient Wo, Dave

FIG. 5

Luna, Craig  
Fr. April 4, 2003

**Health Hero**  
**NETWORK**

(Last Name) P-Contact Health Home D-Home D-Long Chat

**Home Patient Reports Enrollment Disenrollment Schedule Setup**

**Work List Profile Session Trends Notes**

Use these options to change the work list below.

1. Show patients from which program? 2. For which session date? 3. For which care manager?

All Programs — [11/19/2003] — All Care Managers —  
(mmddyyyy)

[Patient-friendly version](#) [Create Work List](#)

---

You are viewing sessions for Nov 19, 2003 in the "All Programs" Program Date:

Responders' Risk Summary				Patient Summary	
Symptoms	Behavior	Knowledge	General	Responders	Non-Responders
Medium Risk	2	0	0	8	4
High Risk	0	1	2		
Total	6	5	2		
None	0	0	6		

**Responses on Monday, November 19, 2003**

Patient	Response Time	Sympt.	Behav.	Knowdg.	Gen.
Lang, Nancy	09:38 AM PST				
Chemey, Julie C.	09:41 AM PST				None
Baninover, Jennifer	11:15 AM PST				Medium None
Messing, Mel	10:16 PM PST		Medium		None
Lang, Mary	09:38 AM PST				Medium None
Coll, Laurne	10:08 PM PST				None
Hoff, Jane	11:14 AM PST				Medium
Man, Mans	09:12 AM PST				None

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**FIG. 6**

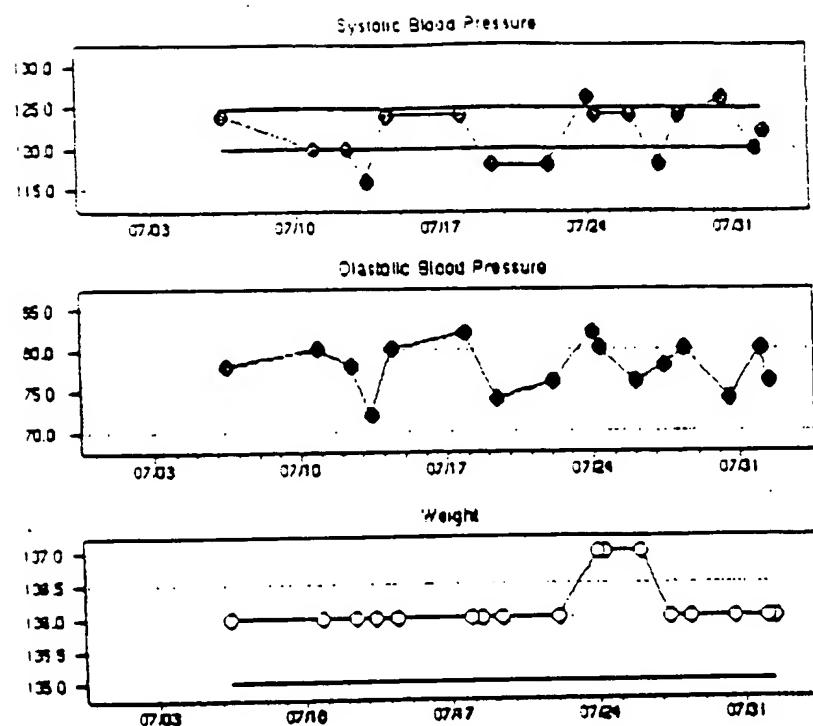
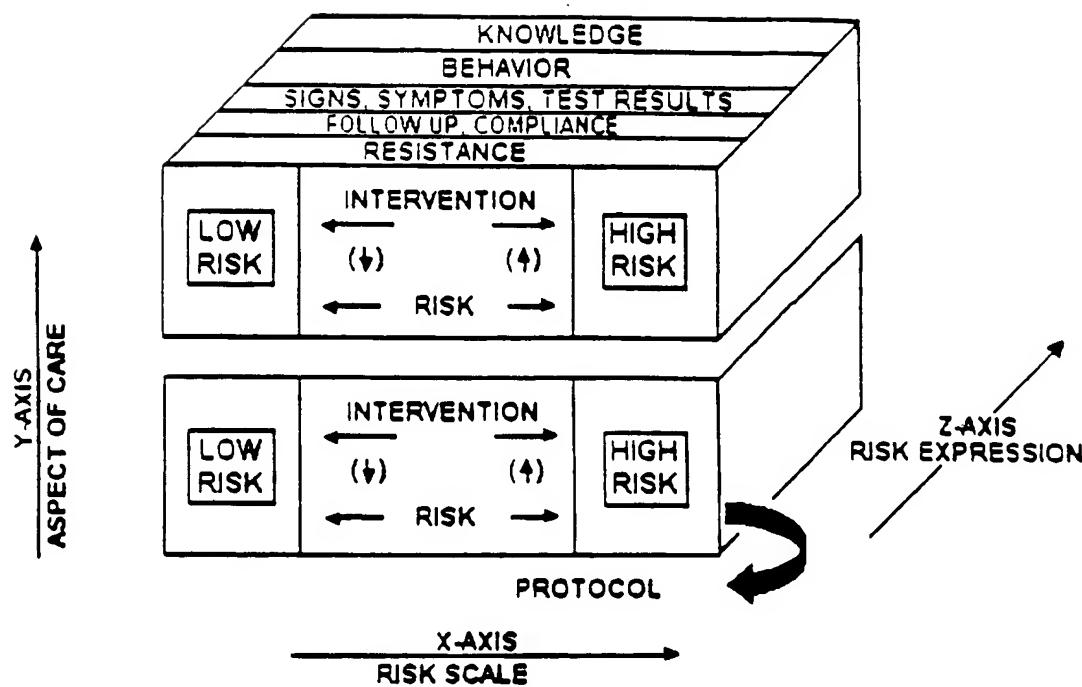


FIG. 7

Blakely, Sokoloff, Taylor & Zafman LLP (408) 947-8200  
Title: Method and System For Integrating Feedback Loops in Medical  
Knowledge Development and Healthcare Management  
1st Named Inventor: Stephen J. Brown Docket No.: 6858P056  
Application No.: 10/821,120  
Sheet: 8 of 31

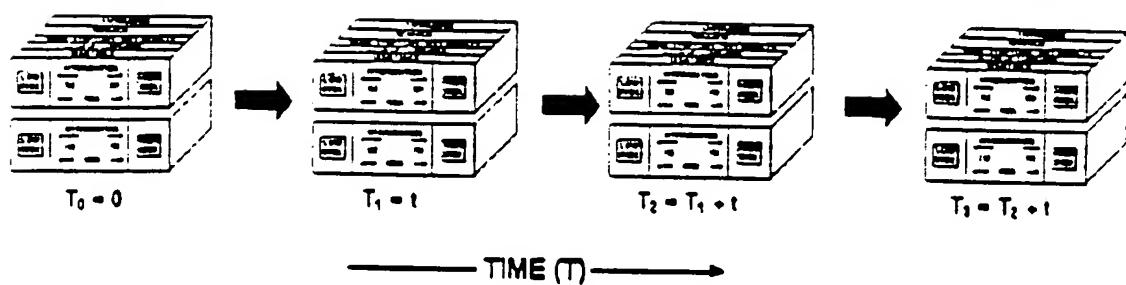


**FIG. 8**

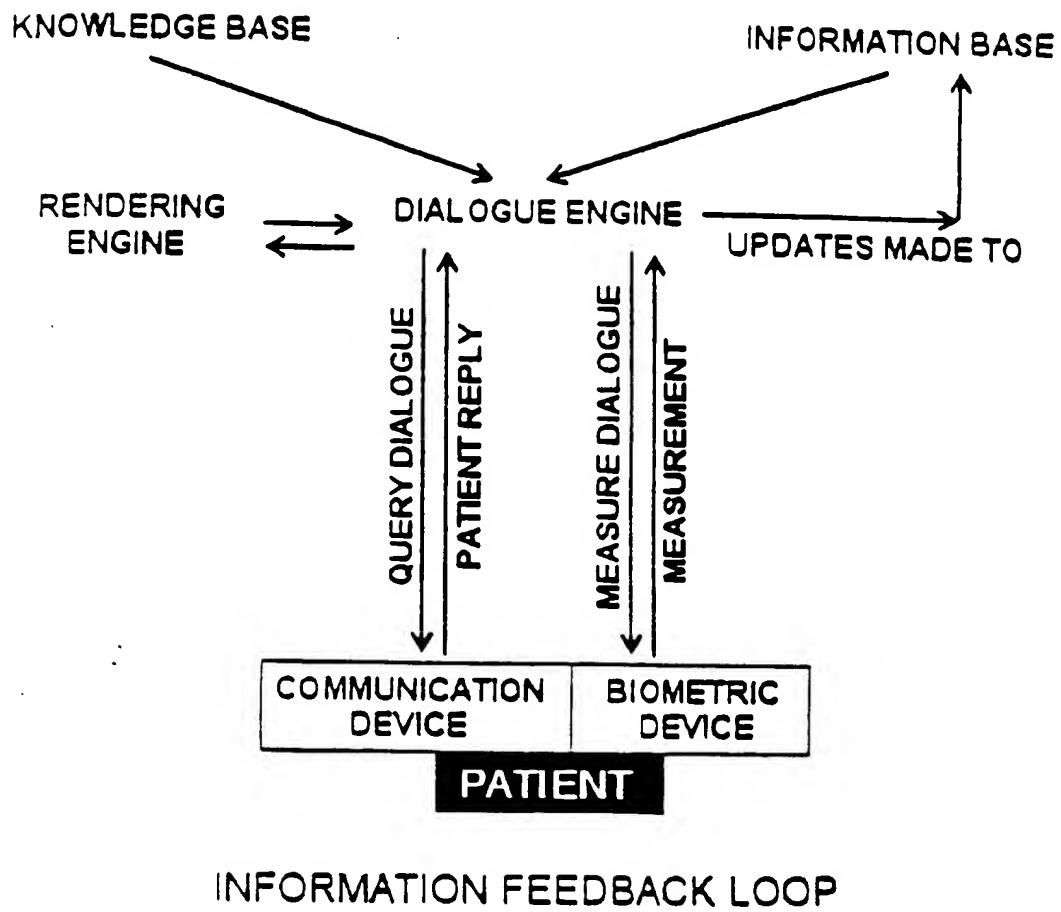


*A 3-dimensional model of disease.*

**FIG. 9**



**FIG. 10**

**FIG. 11**

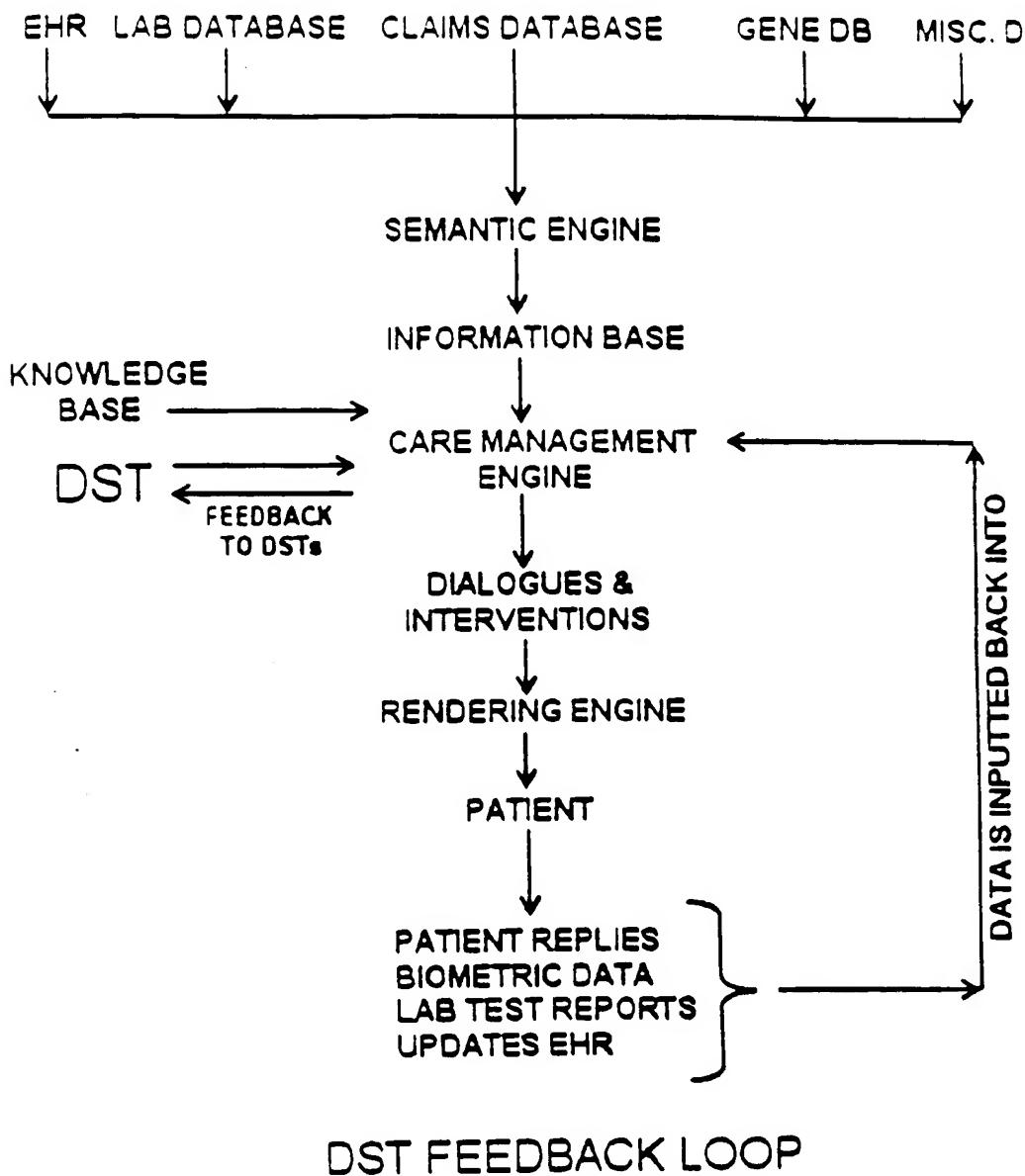
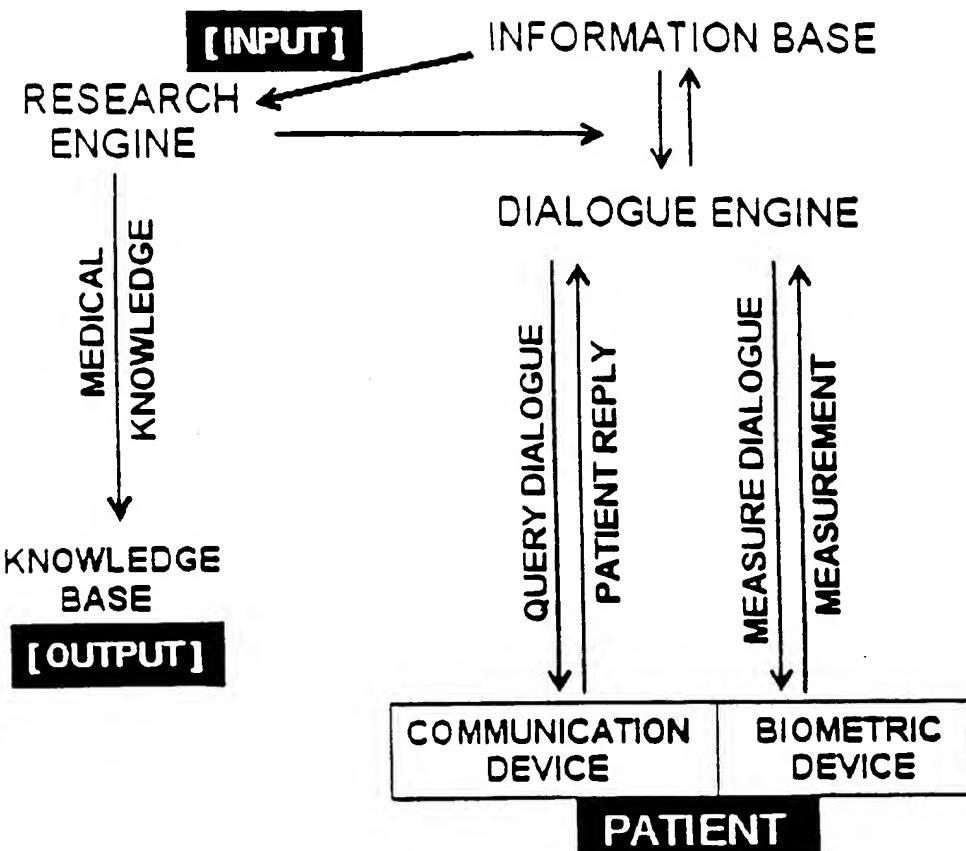


FIG. 12

Research Feedback Loop-



RESEARCH FEEDBACK LOOP

FIG. 13

# Agenda

- Health Hero Network Background
- Current Technology Solutions
- Contribution to MedKnowledge
- Information and Knowledge Acquisition →
  - The Feedback Loops
    - Contribution to Innovations
    - Linkage to Other Parts of Project
    - Patient Trials and Expected Outcomes

FIG. 14

## Health Hero Network Vision

- A better model of care is possible
- Crisis care → Coordinated care
- eHealth Networks and Technologies =  
A Powerful Enabler

FIG. 15

# Health Hero Network

- Founded 1988 in Mountain View, California. Health Hero Network Ltd established 2003 in Dublin, Ireland.
- 25 employees, \$5 million annual sales, serving 30 provider sites and 2500 patients with daily in-home monitoring.
- Solution Partners signed in Ireland, France, Netherlands. Expecting to add Spain, Belgium, Norway in 2003.
- Licensees include Veterans Health Affairs, Mercy Health System, American Medical Alert, TheraSense, Phillips.

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**FIG. 16**

# eHealth Demonstration:

## Veterans Health Affairs (US)

- Chronic care program using model of care based on eHealth Networks and Technologies from Health Hero Network
- 791 elderly high-risk patients with hypertension, heart failure, COPD, diabetes, enrolled for 1 year, compared to comparison group data
- Results (Disease Management, Volume 5, Number 2, 2002)
  - 63% reduction in hospital admissions
  - 60% reduction in hospital bed days
  - 40% reduction in emergency room visits
  - 64% reduction in nursing home admissions
  - 88% reduction in nursing home bed days
  - Significant improvement in Quality of Life

# eHealth Demonstration: Mercy Health System (US)

- Diabetes management program using eHealth Networks and Technologies from Health Hero Network
- 169 low income diabetes patients, one year study period using comparative cohort data from previous calendar year
- Results (Diabetes Technology & Therapeutics Journal, Dec 2002)
  - Outpatient visits reduced 49% ( $p < 0.001$ )
  - Inpatient admissions reduced 32% ( $p < 0.07$ )
  - ER encounters reduced 34% ( $p < 0.06$ )
  - Significant increase in quality of life scores
  - Medication compliance increased from 34% to 94%

FIG. 18

# Health Hero Network Platform

Vision: Open System for Chronic Care Research and Innovation, Any Device, Any Device, Many Partners

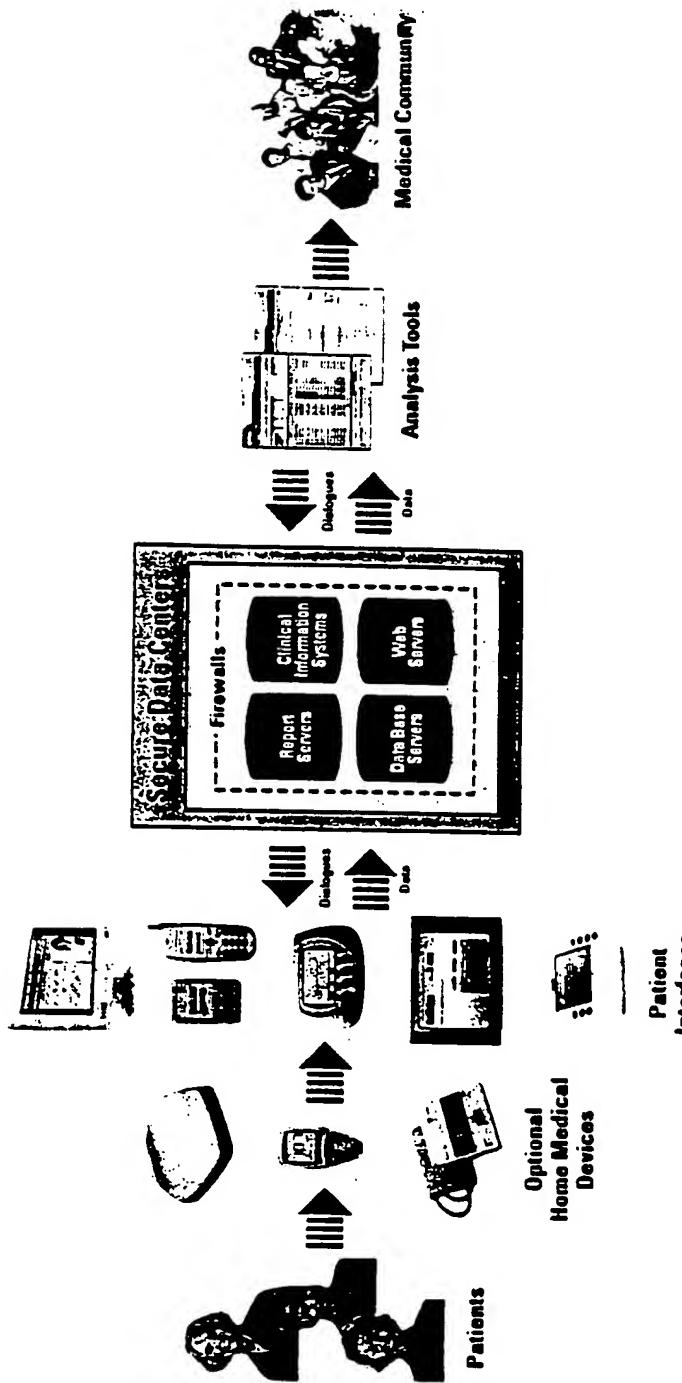


FIG. 19

# Decision Support Tools for Caregivers

## Vision: Intelligent, Simple, Web-based, Integrated with Existing Clinical Information Systems and Care Processes

Laura Craig  
Fri, April 4, 2013

**Health Hero NETWORK**

(Dashboard) Performance Page [Print Page](#)

Logout | Home | Patient | Reports | Enrollment | User Profile | Search | Help

Programs: First C Health & Well Overall Health

Use these options to change the look of the below.

1. Save Patients from which program? 2. For which specific date(s)? For which care manager?

All Programs  [1/17/2013]  [Printable]

Care Manager:  Current View: List

Total # of patients for New (9) New in the All Programs Program Date: ● ●

**Recipient Risk Summary**

Recipient Risk	Number	Percentage	Count
Low	2	20%	2
Medium	5	50%	5
High	2	20%	2
Total	9	100%	9

**Recipients on New (9) Recipients on 3/26/2013**

Recipient	Program	Systolic Blood Pressure	Diastolic Blood Pressure	Cholesterol	Glucose
Laura, Laura C.	08:41 AM CSI	125	78	Medium	None
Cheri, Cheri C.	11:16 AM CSI	125	78	Medium	None
Barbara, Barbara	10:16 PM CSI	125	78	Medium	None
Mel, Mel	08:30 AM CSI	125	78	Medium	None
Lori, Lori	10:08 PM CSI	125	78	Medium	None
Old, Linda	11:11 AM CSI	125	78	Medium	None
New, June	02:12 AM CSI	125	78	Medium	None
Kim, Kim	02:12 AM CSI	125	78	Medium	None

[Back to top](#)

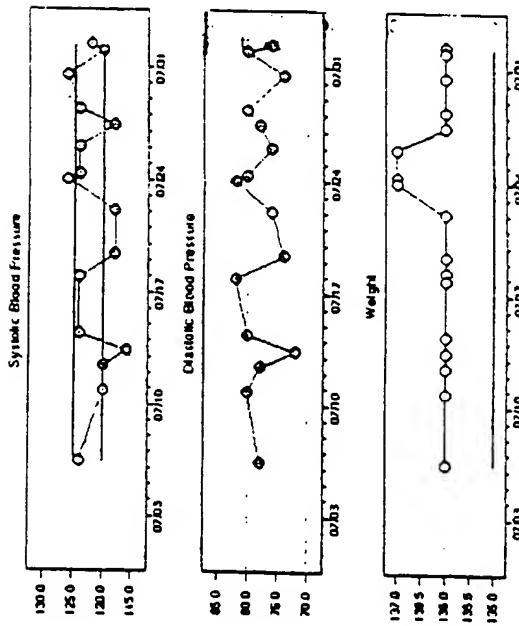


FIG. 20

# Daily Dialogue with the Patient

Vision: Intelligent, Interactive, Personalized, Simple,  
Integrated with Consumer and Medical Devices

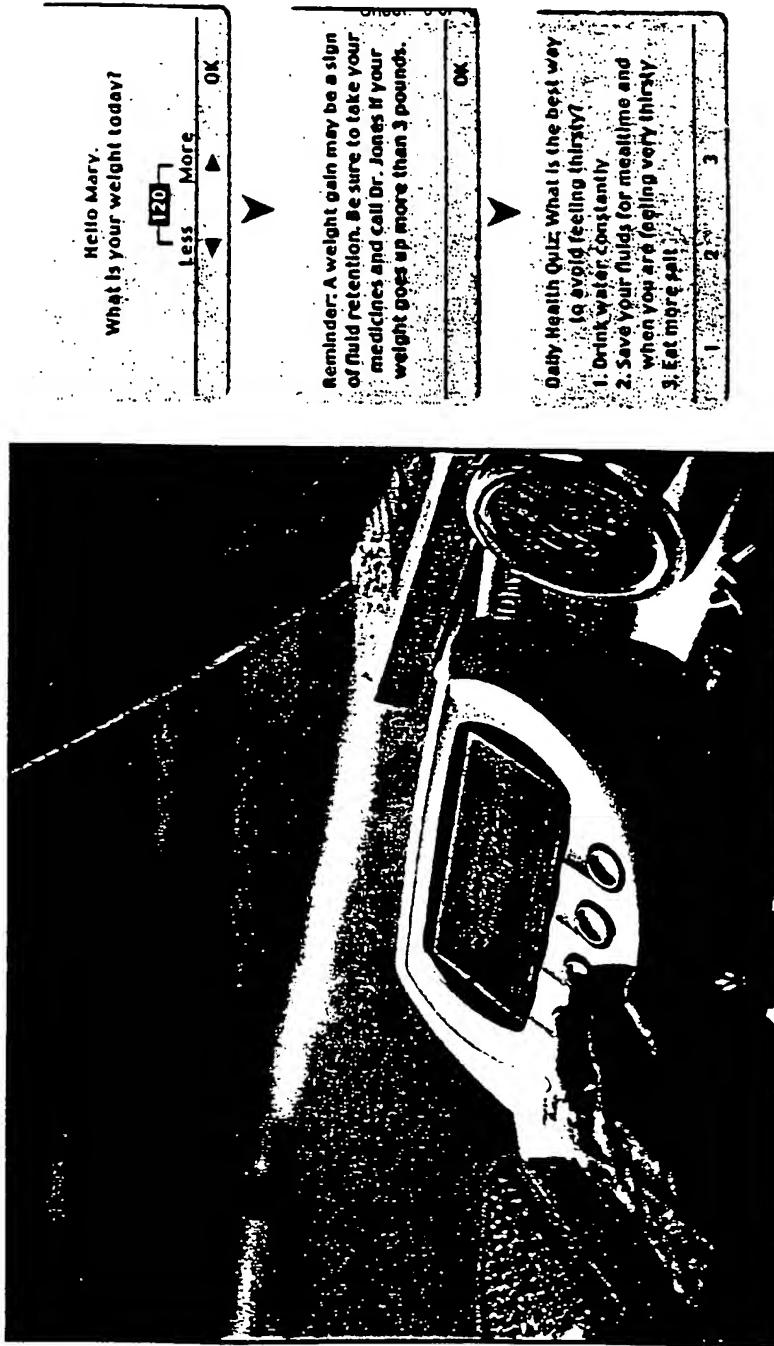


FIG. 21

# Patient Dialogue Content

Vision: Based on Latest Medical Knowledge, Individualized,  
Generating Real-time Information

Blakely, Sokoloff, Taylor & Zafman LLP

(408) 947-8200

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1st Named Inventor: Stephen  
Application No.: 10/821,120

Application No.:  
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FIG. 22

# Health Hero Network Contribution to MediKnowledgeMent

- 1.1 Information and Knowledge Sources and Formats
- 1.2 Information Acquisition → Information Base
- 1.3 Knowledge Acquisition → Knowledge Base
- 1.4 Information and Knowledge Processing → DSTs to identify gaps between Information Base and Knowledge Base (i.e. gaps between what is and what should be)
- 1.5 Information and Knowledge Rendering → Rendering Engine is the interface to end users
- 1.6 Information and Knowledge Acquisition → The Feedback Loops

FIG. 23

# Project Overview

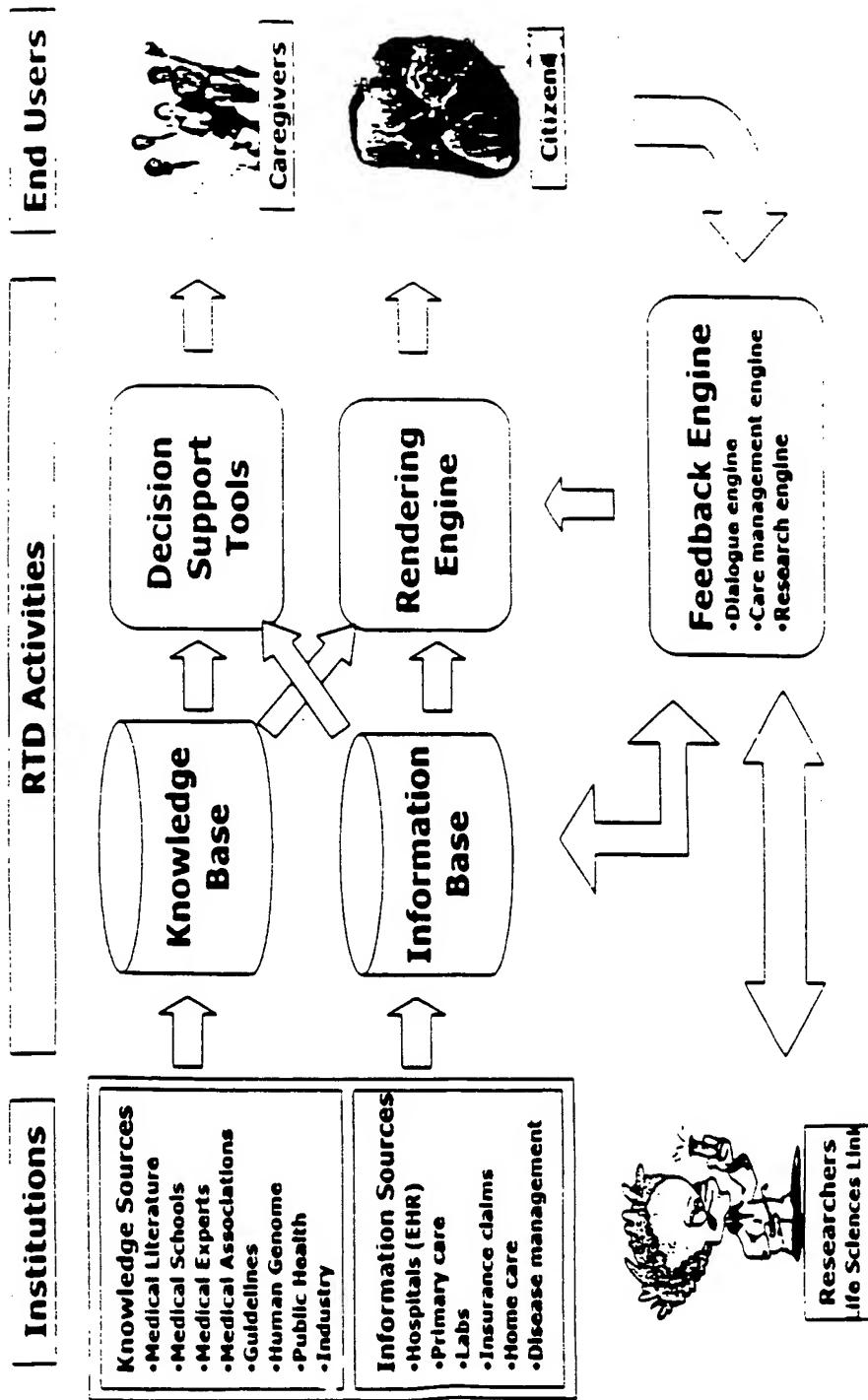


FIG. 24

# Information and Knowledge Acquisition → The Feedback Loops

- Patient Dialogue Engine: Individualized Communication
  - Generated using Information and Knowledge Base
  - Interface with Rendering Engine
  - Feedback to Information Base
- Care Management Engine: Just-in-time Care
  - Generated using Information and Knowledge Base
  - Feedback to DSTs
- Research Engine: Real-time Research
  - Interface to Information Base [extract existing data]
  - Interface to Dialogue Engine [when new data is required]
  - Feedback to Knowledge Base [new discoveries]

FIG. 25

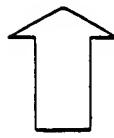
# Health Hero Network

## Contribution to Innovations

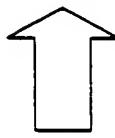
### Current Status

### New Innovations

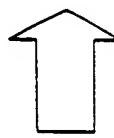
#### Patient Dialogue Engine

- Pre-packaged, mass customized programs
  - Content libraries
  - Health Buddy
- 

#### Care Management Engine

- Risk stratification
  - Organizational workflow and efficiency tools
  - Manual feedback process
- 

#### Research Engine

- Data Export to SAS
- 

- Automated individualization
- Content generated by knowledge base rules applied to information base
- Interface to Rendering Engine for any device

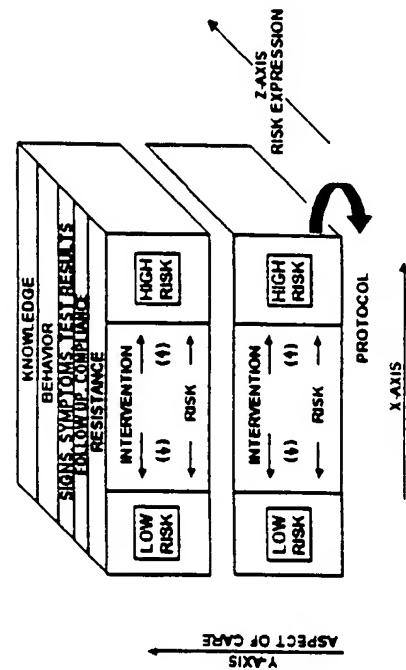
- Intelligent risk tuning and link to DSTs
- Organizational optimization
- Automated feedback loop

- Identify subgroups and correlations
- Test hypotheses on living database

**FIG. 26**

# Integrating Feedback Loops Within MedKnowledgeMent

- Application Program Interfaces
- Standards for Data Classification
- Ontology for Information and Knowledge Used in Feedback Process



A 3-DIMENSIONAL MODEL OF DISEASE

FIG. 27

# Feedback Process

Overall goal is apply and generate medical knowledge in a continuous process that leads to lowest achievable risk resulting in:

- Higher quality of life
- Improved clinical outcomes
- Lower cost of care

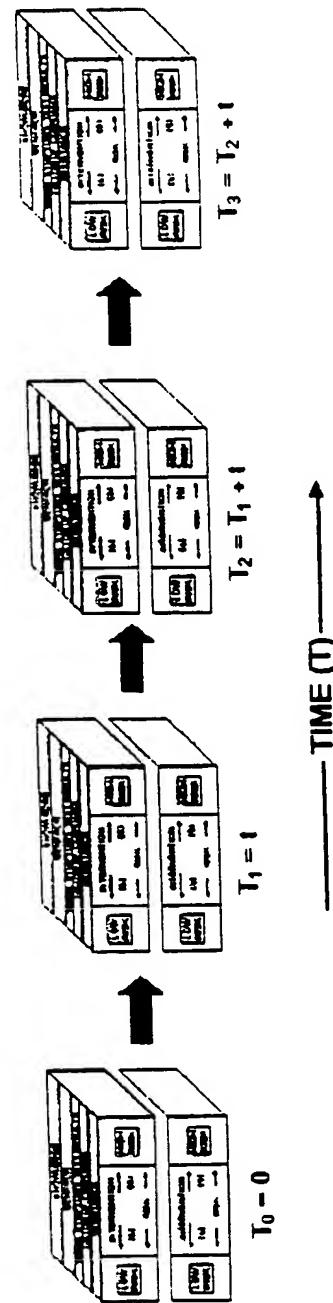


FIG. 28

# Patient Trials

- Application to Major Diseases with Great Cost to Society
- Multi-center Demonstration Project
  - Health care and research centers in Europe
  - Large enough for meaningful result
  - Small enough to fit budget
- Standardized Protocol for Data Collection
- Outcomes Analysis
  - Aggregate data analysis for global impact
  - Site specific data analysis by country, disease, and care model
  - Key measures include: acceptability, satisfaction, utilization, clinical impact, medication compliance, quality of life, cost of care
- Medical Review Board
  - Review and approve all site specific study designs

FIG. 29

## Expected Results

- Reduced emergency department encounters and hospitalizations by detecting patient problems before they become a crisis.
- Improved patient compliance by educating, motivating and monitoring health status and by providing personalized and relevant information.
- Improved safety and quality of care by providing timely and actionable information to healthcare professionals through quality assured processes that can be continuously improved.
- Continuity of care, particularly for the elderly, through integrated, interconnected monitoring and information systems, rather than fragmented, episodic, and crisis driven care.

**FIG. 30**

# Expected benefit to the EU

## Health is a key IST application for all citizens

- Stimulation of investment in information society technologies to modernize healthcare and enable sustained quality and access.
- Creation of an open platform for the application and generation of Medical Knowledge is an opportunity for European leadership at the convergence of information technologies, medical and consumer devices, and networks.
- Clinical applications that can be deployed as new service offerings over existing and new network infrastructures including broadband and wireless networks will stimulate the growth and success of those networks.
- The emerging eHealth sector will become vital to every region in the world that will experience the demands of an aging population and the resulting need for advanced and sustainable models of care.

**FIG. 31**